

in honor of Dr. Alfred S. Warthin, of the University of Michigan, who collected the specimens. Paratypes are in the collection of S. S. Berry (No. 5547) and of the Museum of Zoology, University of Michigan. Types and Paratypes in the Museum of Natural History, University of Illinois.

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#### INHABITANTS OF A NATURAL AQUARIUM.

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BY L. S. FRIERSON.

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Red River having become choked by vast accumulations of drift-logs in the vicinity of Shreveport, Louisiana, carried its waters to the Gulf through many side channels, which soon became possessed of high banks (as had the main river), and the lower lands between these channels acquired local names, some as "lakes," others as "bayous".

The drift however, having been cleaned out by the U. S. Government, and the side channels dammed at their heads, most of the lands constituting the Valley of the Red River are now in cultivation, even some of the former navigable lakes being cultivated.

When first explored by the writer, Bayou Pierre even at low water stage was a fairly large stream, and entitled to the name of "river".

The bed of this stream was swarming with millions of mussel shells, comprising nineteen species.

The creeks emptying into Bayou Pierre in this vicinity contained water of very different kind from that of Red River, the latter being heavily charged with gypsum, lime, and in low water stages even salt could be noticed as one of its flavoring materials. But the creek affluents of the river carry quite "soft" waters, and this difference, if not the cause, is at least correlated with a quite different mussel fauna. *Anondonta grandis* is the single species common to both creek and river.

When the head of Bayou Pierre was dammed across, there ensued of course a tremendous mortality in the naiad population, hundreds of acres of hitherto living waters becoming dry lands.

Gradually the Bayou Pierre has become converted from a stream containing the hard water of Red River to one containing the soft waters of the local creeks, and in fact is now only a large creek, going dry during droughts, except in local pools.

Between Red River and Bayou Pierre a low valley was for long known as Brown Lake, but which now is in rapid process of being put into a high state of cultivation.

A rail road, and a hard surfaced public road now traverse its former site. Alongside of the latter a ditch was dug, five feet wide and two feet deep and in the lower part of the lake site this ditch holds water for some time after rains, during which the ditch communicates with Bayou Pierre situated about a mile away.

In such flood times, fish run up these temporary streams, seeking pools in which to lay their eggs, and as these are oft-times infested with *glochidia* the bottom of the ditch above-mentioned becomes sown with young mussels.

It has so happened that the past two years have been unusually wet, and the rains have been quite equably distributed during the year, and hence the ditch in question, in its lower portion of about two hundred feet in length, has been continuously more or less full of water, until the present autumn (1922).

The writer had occasion to walk down this dry ditch and somewhat to his astonishment found hundreds of mussel shells on the bottom, some of which being collected proved of much interest.

A single *Anodonta grandis* was found, almost five inches long, showing a quite rapid growth, for it is impossible that this shell is more than *thirty months* old; most likely its age is only eighteen months.

The most interesting cases however are of the two following shells. The writer, in Nautilus, 1903, showed that *Unio tetraltasnus* Say, with its several synonyms and the *Unio declivis* Say with its synonym *geometricus* Lea, were entirely distinct species, differing in shape, size, color of nacre and habitats.

This has been strikingly proven true by the changes in the local conditions outlined above. In the dried bed of Brown

Lake, great numbers of old dead shells of the *A. geometricus* can still be picked up; but in the many years of personal collecting done by the writer, no specimen of *tetralasmus* has ever been found in any Red River water. How interesting it was, then to find that the bottom of the ditch mentioned is teeming with typical *tetralasmus*, and not a single *geometricus* exists, I am sure, in this vicinity.

The latter form is universally held by all writers, including Lea himself, to be a local form of *Unio declivis* Say. The single exception to this reference was Simpson, who in his Catalogue of 1914, cites the figure of *geometricus* given in Nautilus, 1903, Plate III, as being *camptodon* Say!

The population of this local aquarium however contained another surprise. For many years the writer has tried to prove by concrete material, what he was convinced to be true, that *Unio haleianus* Lea was merely an individual variant of *texasensis*; but no material had ever been obtained which could *prove* this *intuition*. Along with the *tetralasmus* in this ditch, the writer found hundreds of *texasensis*, and to his delight, a specimen of extra large size proved to be *typical haleianus*!

Although the bed of this little pond has been dry for the past two months, all of the *tetralasmus* are still living, and quite a number of the *texasensis* are also alive, but the majority are recently dead.

Notwithstanding that this pool of water was very seldom more than one foot deep, it seems to have been an almost ideal habitat for the three species mentioned, so long as the rains lasted.

One of the conditions which rendered this pool an almost *optimum* locality is the fact that being situated in an open commons, there is no shade, not even of weeds, to obstruct the sunshine.

It may not be known to every reader that the paucity of Naiades in the Tropics is thought by those who have collected in those regions to be largely due to the dense shade covering all but the larger streams.

The exploration of this ditch however furnished still another item of interest. As the pool dried up, the exposed *texasensis*

began to die, and their valves gaping, the exposed contents were eaten by birds, and the latter not being content with their daily dead, in several cases undertook to expedite the process by pecking holes through their valves. With such force was this done that, in every case noted, *both valves* were punctured at once. Whether this action of these birds is due to *instinct* or to *reason*, the writer being strictly a Naiadologist leaves it to other better equipped observers to decide; merely remarking that this process has been previously observed, and the pecked shells in the writers cabinet now number three, from widely separate localities.

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THE ANATOMY AND TAXONOMY OF CERTAIN UNIONINAE AND  
ANODONTINAE FROM THE GULF DRAINAGE.

BY A. E. ORTMANN, PH. D.

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Lea and Simpson distinguished from *Lasmigona holstonia* a species, *georgiana* (originally described under the preoccupied name *etowahensis* Lea), chiefly on the ground that the beak sculpture is said to be not double-looped, but concentric, and that the pseudocardinals are single in each valve. This form has been reported from Etowah River, Ga., and also from Tennessee, but so far only the types of Lea (two, according to Simpson) are known. They have badly eroded beaks and rudimentary pseudocardinals. According to my experience such beaks are often seen in *L. holstonia*, and the development of the pseudocardinals is very variable. The posterior (interdental) tooth of the left valve often is very poorly developed, or even absent, and sometimes also the anterior one is obsolete, so that there is only one tooth in each valve, and, in extreme cases, even this tooth may become rather small. Such cases of reduction of the hinge teeth are seen chiefly in older shells, in specimens both from the Coosa and from the Tennessee drainage, but such specimens are always associated with normal ones. Thus I do not entertain the slightest doubt that the